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TECHNICAL INSPECTION REPORT

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Classification (Cancelled) (Changed to  
By Authority of Joint Chiefs of Staff (Action 15 Apr 49)  
Date 24 Apr 51

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Director  
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Washington, D. C. 20301

U.S.S. WILSON (CDD408)

TEST ABLE [U].

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SPECIAL WEAPONS PROJECT

OPERATION CROSSROADS.

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BUREAU OF SHIPS GROUP  
TECHNICAL INSPECTION REPORT

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F.X. Forest,  
Captain, U.S.N.

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USS WILSON (DD-408)

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SECRET

USS WILSON (DD408)

U.S.S. WILSON (DD 408)

SHIP CHARACTERISTICS

Building Yard: Puget Sound Naval Shipyard.

Commissioned: 5 July 1939.

HULL

Length Overall: 340 feet 9 inches.

Length on Waterline: 334 feet 0 inches.

Beam (extreme): 35 feet 6 inches.

Depth (molded at side, to main deck, amidships):  
19 feet 7 7/8 inches.

Drafts at time of test: Fwd. 13 feet 0 inches.

Aft. 11 feet 6 inches.

Standard displacement: 1,500 tons.

Displacement at time of test: 2,092 tons.

MAIN PROPULSION PLANT

Main Engines: Two sets of Westinghouse turbines are installed, one set per shaft.

Reduction Gears: Two sets of Westinghouse manufacture (De-Laval design) double reduction are installed, one per shaft.

Main condensers: Two are installed in ship.

Boilers: Three Babcock and Wilcox boilers are installed in ship. 565 psi gauge. 715° F.

Propellers: Two are installed in ship.

Main Shafts: Two are installed in ship.

Ships Service Generators: Four are installed in ship.

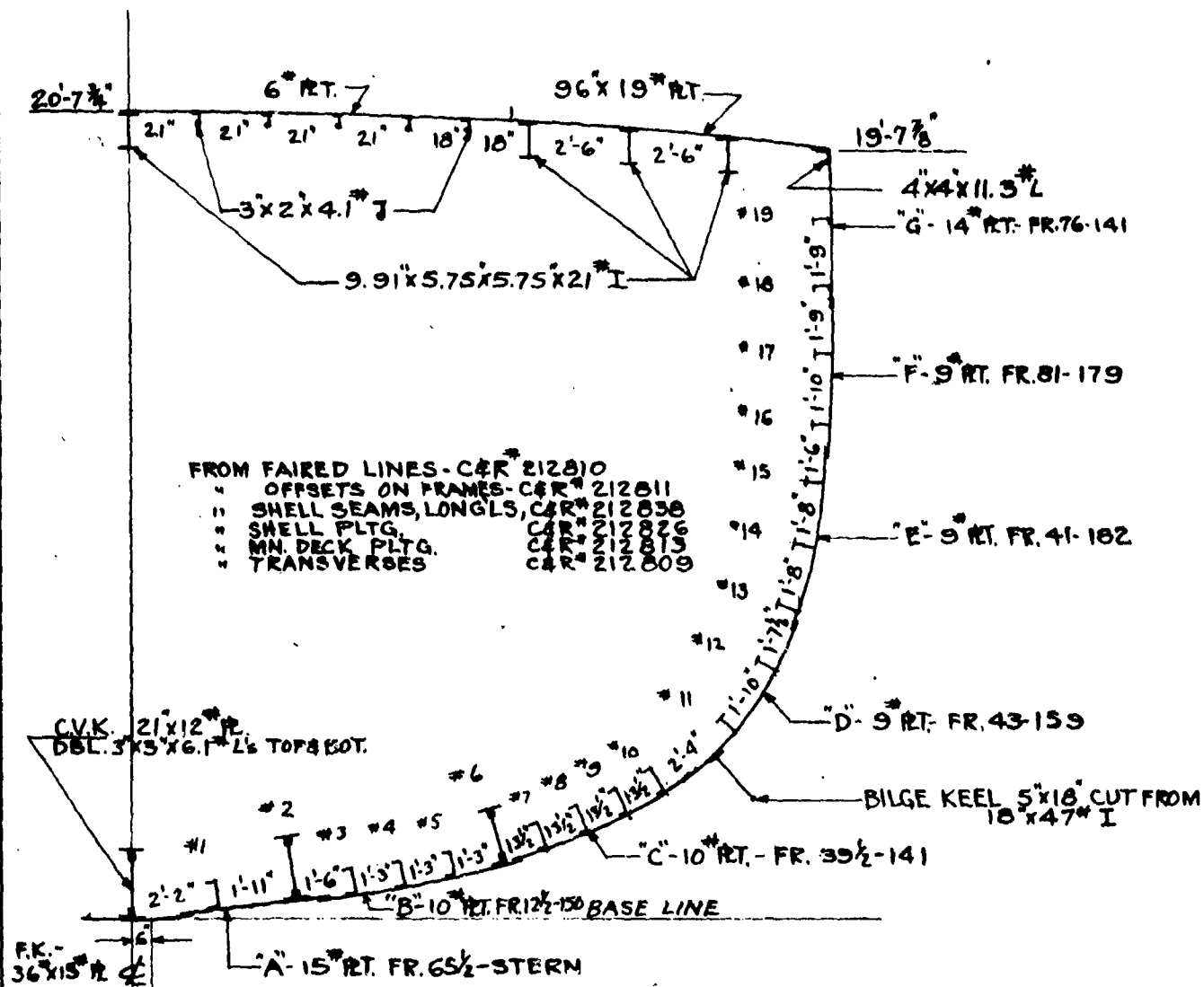
Two - 200 KW. - A.C., two 40 KW. - D-C. sets.

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USS WILSON (DD408)

LONG L 1-9x2 1/2 x 13.4 C  
 " 2-19 1/4 x 7 RT. 3x2x4.1 L  
 " 3-4-5-8x2 1/4 x 11.5 C  
 " 6-17x7 RT. 3x2x4.1 L  
 " 7-8-9-10-8x2 1/4 x 11.5 C  
 " 11-12-13-14-6x3.06x5.87 T's  
 " 15-16-17-5x2.69x4.48 T's  
 " 18-19-5x1 1/4 x 1 1/4 x 6.7 C

7.65 WEB SPCD-7'-0"  
 KEEL BKT. SPCD.- EVERY FRAME



## MIDSHIP SECTION FR. 96 TEST A

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## TECHNICAL INSPECTION REPORT

### OVERALL SUMMARY

#### I. Target Condition After Test.

##### (a) Drafts after test; list; general areas of flooding, sources.

There is no flooding, consequently no change in drafts or list.

Draft before and after Test:

Forward, 12' 6"; Aft 11' 1"; List 0°.

##### (b) Structural Damage.

### HULL

Structural damage is confined principally to superstructure areas forward of amidship facing to starboard and to the starboard shell plating. The stack breeching is damaged by blast pressure. The starboard flag bag was blown from its securing clips. Dishing of the starboard shell occurred between the main and forecastle decks, frames 40 to 69, and resulted in failure of web frame 52. The starboard shell is dished also from the main deck down approximately 6 feet, frames 72 to 76. Maximum depth of shell dishing is 3 inches in the forward area and 2 1/2 inches in the amidship area. A moderate degree of irregularity of shell plating is general throughout and is believed to be the result of normal operating conditions. Damage to the shell does not significantly affect the longitudinal strength of the ship.

Longitudinal weather bulkheads facing to starboard are dished on the navigating bridge, superstructure deck and forecastle deck. Dishing of superstructure bulkheads reaches a maximum of 2 inches in way of the CIC Room, frames 57 1/2 to 64. Doors and door frames in the superstructure are dished generally on the starboard side.

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## MACHINERY

A crack in the breeching between uptakes and stack above main deck, starboard side, which existed before Test A, was lengthened. The outer casing of the breeching was moderately dished on the starboard side. The whistle pull was broken.

## ELECTRICAL

There was no structural damage in way of electrical equipment.

(c) Other damage.

## HULL

No damage occurred to machinery, or to ship control, fire control, or gunnery equipment. Vertical radio antennae were carried away by the falling starboard flag bag.

## MACHINERY

Except for the inconsequential damage mentioned in I (b) above, there was no damage to machinery of this vessel during Test A.

## ELECTRICAL

No damage occurred to electrical equipment due to Test A.

## II. Forces Evidenced and Effects Noted.

(a) Heat.

## HULL

The source of heat radiation bore approximately 30 degrees relative. Paint is scorched on surfaces facing forward or to starboard, and the forecastle deck plating is scorched. All exposed lines are scorched, old line being damaged to a greater degree than new.

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### MACHINERY

Paint on exposed machinery was scorched and blistered.

### ELECTRICAL

No evidence of heat in way of electrical equipment.

(b) Fires and explosions.

### HULL

No explosions occurred in this ship. A fire occurred in kapok life jackets stowed on the forward side of a gun bulwark, frame 126, starboard.

### MACHINERY

No evidence.

### ELECTRICAL

There were no fires or explosions in way of electrical equipment.

(c) Shock

### HULL

None.

### MACHINERY

No evidence.

### ELECTRICAL

There was no evidence of shock in way of electrical equipment.

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(d) Pressure.

HULL

Blast pressure came from an angle of approximately 30 degrees relative. Structure yielding under the effects of blast are aluminum weather bulkheads, doors, and door frames in the superstructure, light steel bulwarks, and areas of the starboard shell plating forward of amidship. Aluminum bulkheads and steel bulwarks of less than 1/4 inch thickness suffered panel dishing.

MACHINERY

Blast pressure lengthened an already existing crack in the breeching between uptakes and stack above the main deck, moderately dished the outer casing of the breeching, and broke the whistle pull. The blast came from starboard.

ELECTRICAL

There was no evidence of pressure in way of electrical equipment.

(e) Effects peculiar to the Atom Bomb.

HULL

The only effect peculiar to the Atom Bomb is the intense heat.

MACHINERY

Blast pressure sufficient to have a noticeable effect at this distance from an explosion is apparently peculiar to the Atom Bomb.

ELECTRICAL

Radiant heat and radioactivity were evident on exposed surfaces. There was no damage to electrical equipment due to these effects.

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III. Effects of Damage.

(a) Effect on machinery, electrical, and ship control.

HULL

Not observed.

MACHINERY

None. All machinery that was operable before Test A was operated after it, and functioned normally. The ship shifted berths under her own power after Test A.

ELECTRICAL

No damage was apparent to electrical machinery or ship control.

(b) Effect on gunnery and fire control.

HULL

Not observed.

MACHINERY

No comment.

ELECTRICAL

No damage apparent.

(c) Effect on watertight integrity and stability.

HULL

Not observed.

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#### MACHINERY

No comment.

#### ELECTRICAL

No electrical damage affected watertight integrity or stability.

(d) Effect on personnel and habitability.

#### HULL

Habitability is unaffected. Personnel in exposed locations would have suffered casualties from the intense heat of the bomb explosion and possibly from the blast.

#### MACHINERY

None below decks.

#### ELECTRICAL

No electrical damage affected personnel or habitability.

(e) Effect on fighting efficiency.

#### HULL

Fighting efficiency is essentially unimpaired by the Test. A temporary lapse of communication would have resulted from the loss of radio antennae.

#### MACHINERY

None.

#### ELECTRICAL

No electrical damage affected the fighting efficiency of the vessel.

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#### IV. General Summary.

##### HULL

Damage to this ship is superficial. Deflection of bulkheads and shell plating is not sufficient to impair the strength of the ship.

##### MACHINERY

The WILSON was outside the effective range of the explosion during Test A.

##### ELECTRICAL

No damage was evident on any electrical equipment on this vessel. It appears that the effects of the A bomb at the distance of this vessel from the center of the blast require no special precautions or designs for electrical equipment.

#### V. Preliminary Recommendations.

##### HULL

Plating less than 1/4 inch in thickness should not be used in superstructure locations exposed to blast pressure of this magnitude. Inasmuch as shell plating appears vulnerable to blast pressure at this range, attention should be given to shell plating weights used in new designs. Web frames and shell longitudinals should be of adequate scantlings and lightening holes and cut-outs for longitudinals should be eliminated. Topside fittings, such as flag bags, should be more securely attached to the ship's structure. Flag bags, as at present designed, are too light to withstand the effects of blast.

##### MACHINERY

None.

##### ELECTRICAL

None.

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# TECHNICAL INSPECTION REPORT

## SECTION I - HULL

### GENERAL SUMMARY OF HULL DAMAGE

#### I. Target Condition After Test.

(a) There is no flooding, consequently no change in drafts or list.

Draft before and after Test:

Forward, 12'-6"; Aft 11'-1"; List 0°

#### (b) Structural Damage.

Structural damage is confined principally to superstructure areas forward of amidship facing to starboard and to the starboard shell plating. The stack breeching is damaged by blast pressure. The starboard flag bag was blown from its securing clips. Dishing of the starboard shell occurred between the main and forecastle decks, frames 40 to 69, and resulted in failure of web frame 52. The starboard shell is dished also from the main deck down approximately 6 feet, frames 72 to 76. Maximum depth of shell dishing is 3 inches in the forward area and 2 1/2 inches in the amidship area. A moderate degree of irregularity of shell plating is general throughout and is believed to be the result of normal operating conditions. Damage to the shell does not significantly affect the longitudinal strength of the ship.

Longitudinal weather bulkheads facing to starboard are dished on the navigating bridge, superstructure deck and forecastle deck. Dishing of superstructure bulkheads reaches a maximum of 2 inches in way of the CIC Room, frame 57 1/2 to 64. Doors and door frames in the superstructure are dished generally on the starboard side.

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(c) Other damage.

No damage occurred to machinery, or to ship control, fire control, or gunnery equipment. Vertical radio antennas were carried away by the falling starboard flag bag.

II. Forces Evidenced and Effects Noted.

(a) Heat.

The source of heat radiation bore approximately 30 degrees relative. Paint is scorched on surfaces facing forward or to starboard, and the forecastle deck plating is scorched. All exposed lines are scorched, old line being damaged to a greater degree than new.

(b) Fires and Explosions.

No explosions occurred in this ship. A fire occurred in kapok life jackets stowed on the forward side of a gun bulwark, frame 126, starboard.

(c) Shock.

None.

(d) Pressure.

Blast pressure came from an angle of approximately 30° relative. Structure yielding under the effects of blast are aluminum weather bulkheads, doors, and door frames in the superstructure, light steel bulwarks, and reas of the starboard shell plating forward of amidships. Aluminum bulkheads and steel bulwarks of less than 1/4 inch thickness suffered panel dishing.

(e) Effects peculiar to the Atom Bomb.

The only effect peculiar to the Atom Bomb is the intense heat.

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### III. Effects of Damage.

(a) Effect on machinery, electrical, and ship control.

No observed.

(b) Effect on gunnery and fire control.

No observed.

(c) Effect on watertight integrity and stability.

Not observed.

(d) Effect on personnel and habitability.

Habitability is unaffected. Personnel in exposed locations would have suffered casualties from the intense heat of the bomb explosion and possibly from the blast.

(e) Effect on fighting efficiency.

Fighting efficiency is essentially unimpaired by the Test. A temporary lapse of communication would have resulted from the loss of radio antennae.

### IV. General Summary.

Damage to this ship is superficial. Deflection of bulkheads and shell plating is not sufficient to impair the strength of the ship.

### V. Preliminary Recommendations.

Plating less than 1/4 inch in thickness should not be used in superstructure locations exposed to blast pressure of this magnitude. Inasmuch as shell plating appears vulnerable to blast pressure at this range, attention should be given to shell plating weights used in new designs. Web frames and shell longitudinals should be of adequate scantlings and lightening holes and cut-outs for longitudinals should be eliminated. Topside fittings, such as flag bags, should be

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more securely attached to the ship's structure. Flag bags, as at present designed, are too light to withstand the effects of blast.

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## DETAILED DESCRIPTION OF HULL DAMAGE

### A. General Description of Hull Damage.

#### (a) Overall condition of vessel.

The blast center was approximately 30 degrees relative. Damage to this vessel is superficial and is confined essentially to vertical surfaces facing to starboard. Dishing of the starboard shell plating occurred forward of amidship, but this damage is not sufficient to impair the longitudinal strength. Weather bulkheads and doors in the superstructure are distorted. The stack and mast are undamaged. General views of the exterior of the ship are shown on pages 41 to 44 .

#### (b) General areas of hull damage.

Dishing of the starboard shell occurred between the main and forecastle decks, frames 40 to 69, and from the main deck down approximately 6 feet between frames 72 and 76. On the superstructure deck the CIC Room starboard bulkhead is dished. The radio room starboard bulkhead on the forecastle deck is similarly damaged. Bulkhead distortion exists on the starboard wing of the navigating bridge. Light to moderate distortion of doors and door frames in weather bulkheads facing to starboard occurred, principally in the superstructure. A gun bulwark and a director shield are dished. The stack breeching is damaged on the top and starboard sides.

#### (c) Apparent causes of hull damage in each area.

All hull damage is considered to be the result of blast pressure.

#### (d) Principal areas of flooding with sources.

No flooding.

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(e) Residual strength, buoyancy, and effect of general condition of hull on operability.

Residual strength, buoyancy, and operability are not affected.

B. Superstructure.

(a) Description of damage.

Damage to superstructure is confined to forward of amidship. Superstructure bulkheads (aluminum) suffered slight to moderate dishing of surfaces exposed to the blast. Doors and door frames are dished in varying degree, whether exposed or shielded. On the superstructure deck the CIC Room starboard bulkhead, frames 57 1/2 to 64, is dished a maximum of 2 inches. On the forecastle deck, the radio room starboard bulkhead and door at frame 70 1/2 is moderately dished. (Photos 2005-2 and 12; pages 45 and 46 ). On the navigating bridge the pilot house starboard bulkhead and door are slightly dished.

The starboard flag bag was blown loose from the four clips by which it was secured at the after edge of the navigating bridge and fell to the forecastle deck. In falling, the bag carried away two radio antennae and damaged the canopy of the whaleboat. (Photos 2005-7 and 12; pages 47 and 46 ).

The 5 lb plate shield of the 5 inch director located on top of the pilot house is dished 1 inch on the starboard side.

A sheet metal ladder shield on the shielded side of the superstructure was buckled by blast pressure.

The bulwark of the 20MM gun at frame 100, starboard, is distorted.

The top of the stack forward breeching is buckled downward and riveted seams are separated. (Photos 2005-8 and 1826-4; pages 48 and 49 ). The starboard side of the forward breeching

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is dished. (Photos 2170-12, 2005-9, 1826-5; pages 50, 51, and 52). The after breeching is undamaged.

One stay of the foremast is broken at the turnbuckle in way of a repair weld.

All vertical radio antennae were blown down.

(b) Causes of damage in each area.

All damage to superstructure is considered to have been the result of blast pressure.

(c) Evidences of fire in the superstructure.

Fire occurred in kapok life jackets stowed in a floater net rack located on the forward side of the starboard 40MM gun tub, frame 126. The jackets were inclosed in a white cotton mattress cover. No damage resulted from this fire other than burning of paint on the gun tub. Photo 1850-4, page 1, shows the burned area and a life jacket stowage similar to that which burned.

Considerable scorching of unpainted canvas parcelling on a life raft gripe, frame 54 starboard, occurred. All exposed lines were scorched in varying degree, new lines being less severely scorched than old. The starboard signal halyards charred and carried away.

(d) Estimate of relative effectiveness of plating.

The pressure resulting from the blast affected primarily aluminum structure plating and steel gun bulwarks of less than 1/4 inch plate. Weather tight doors were particularly affected.

(e) Constructive criticism of superstructure design or construction.

Plating less than 1/4 inch in thickness should not be used for weather bulkheads or gun tubs. Miscellaneous topside

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installations such as flag bags, ladders, and mooring line reels should be more securely attached to the structure. The design of weathertight and watertight doors and the associated bulkhead structure and door frames should be reviewed. Gun tubs and exposed control stations do not offer sufficient protection to personnel against the effects of heat and blast.

C. Gun Mounts, Guns, Directors, and Rangefinders.

No damage was sustained by guns, mounts, directors, or rangefinders. The canvas bloomers on all the 5 inch gun mounts were torn by the blast.

D. Torpedo Mounts, Depth Charge Gear.

No damage is known to have occurred to torpedo or depth charge launching equipment.

E. Weather Deck.

No damage to weather decks occurred other than scorching of paint on the forecastle. Locations and readings of deck deflection scratch gages are tabulated on page 58.

At the main deck, frame 106, starboard, the door and door frame to the 20MM clipping room was slightly dished.

No damage occurred to the whaleboat (except damage to the canopy by the falling starboard flag bag), to boat handling equipment, or to mooring and towing fittings.

F. Exterior Hull (Above Waterline).

Dishing of the starboard shell occurred as a direct result of blast pressure. The starboard shell is dished between the main and forecastle decks, frames 40 to 69. The maximum indentation of 3 inches at frame 52 caused structural failure of web frame 52.

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The starboard shell is also dished from the main deck down approximately 6 feet, frames 72 to 76. Maximum shell deflection in this area is 2 1/2 inches. Damage to the starboard shell in the forward area is shown by photos 2006-3 and 4, pages 54 and 55. Slight to severe "washboarding" of shell plating is general in this ship. This is believed to be the result of normal operating conditions. (Photos 1710-3 and 4; pages 44 and 43).

G. Interior Compartments (Above Waterline).

Interior compartments are unaffected except for structural failure of web frame 52, starboard, in way of shell dishing. Frame 52 is severely distorted just below the curved bracket connecting the web frame with the transverse girder under the fore-castle deck. At the tangent point of the curve, the frame flange is joggled inboard 1 inch. The frame web is ruptured 2 feet above the main deck in way of a cut-out for a shell longitudinal and also in way of a lightening hole about 1 foot above the main deck.

Habitability of interior compartments is not affected.

H. Armor Decks.

No applicable.

I. Interior Compartments (Below Waterline).

No damage is known to have occurred in compartments below the waterline. There was no flooding. Watertight subdivision, habitability, and utility of spaces are unaffected.

J. Underwater Hull.

Buoyancy, operability, and maneuverability are unaffected. No damage is known to have occurred to shafts, propellers, struts, or rudder.

K. Tanks.

No damage to tanks has been discovered.

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L. Flooding.

There was no flooding.

M. Ventilation.

No damage to ventilation ducts or equipment has been reported. There is no evidence that the ventilation system conducted heat, blast, fire, or smoke below decks.

N. Ship Control.

Ship control, propulsion, and steering are unaffected. No electrical damage was caused by the Test.

O. Fire Control.

Fire control is unaffected. However, the 5 lb. plate shield of the 5 inch director is dished 1 inch on the starboard side.

P. Ammunition Behavior.

Unaffected.

Q. Ammunition Handling.

No damage is known to have occurred to any ammunition handling device.

R. Strength.

There is no evidence of permanent hog or sag. Evidence of panel deflection under blast exists in dishing of superstructure weather bulkheads and dishing of the starboard shell plating above the waterline. Damage to shell plating does not affect significantly the longitudinal strength of the ship. However, shell plating appears vulnerable to blast pressure. In new designs, special attention should be given to weight of plating and to scantlings of web frames and shell longitudinals.

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S. Miscellaneous.

(a) Heat effects.

Paint was scorched generally, rather than blistered.  
Darker paint was affected to a greater degree than lighter paint.  
Photograph 1850-3, page 56.

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# TECHNICAL INSPECTION REPORT

## SECTION II - MACHINERY

### GENERAL SUMMARY OF MACHINERY DAMAGE

#### I. Target Condition After Test.

- (a) Drafts after test; list; general areas of flooding, sources.

No comment.

- (b) Structural damage.

A crack in the breeching between uptakes and stack above main deck, starboard side, which existed before Test A, was lengthened. The outer casing of the breeching was moderately dished on the starboard side. The whistle pull was broken.

- (c) Other damage.

Except for the inconsequential damage mentioned in I (b) above, there was no damage to machinery of this vessel during Test A.

#### II. Forces Evidenced and Effects Noted.

- (a) Heat.

Paint on exposed machinery was scorched and blistered.

- (b) Fires and explosions.

No evidence.

- (c) Shock.

No evidence.

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USS WILSON (DD408)

(d) Pressure.

Blast pressure lengthened an already existing crack in the breeching between uptakes and stack above the main deck, moderately dished the outer casing of the breeching, and broke the whistle pull. The blast came from starboard.

(e) Effects apparently peculiar to the atom bomb.

Blast pressure sufficient to have a noticeable effect at this distance from an explosion is apparently peculiar to the atom bomb.

III. Effects of Damage.

(a) Effect on machinery and ship control.

None. All machinery that was operable before Test A was operated after it, and functioned normally. The ship shifted berths under her own power after Test A.

(b) Effect on gunnery and fire control.

No comment.

(c) Effect on water-tight integrity and stability.

No comment.

(d) Effect on personnel and habitability.

None below decks.

(e) Total effect on fighting efficiency.

None.

IV. General Summary.

The WILSON was outside the effective range of the explosion during Test A.

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V. Preliminary Recommendation.

None.

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## DETAILED DESCRIPTION OF MACHINERY DAMAGE

### A. General Description of Machinery Damage.

#### (a) Overall condition.

A crack in the breeching between the uptakes and the stack, above main deck, starboard, which existed before Test A, was lengthened. The breeching was moderately dished on the starboard side. This is only superficial damage and does not impair operation. Otherwise, the condition of the machinery plant was not changed by Test A.

#### (b) Areas of major damage.

None.

#### (c) Primary cause of damage in each area of major damage.

Not Applicable.

#### (d) Effect of target test on overall operation of machinery plant.

Overall operation of machinery plant was not affected by the target test.

### B. Boilers.

There was no damage to the boilers or stack. A thin crack existing before Test A in the starboard side of the breeching between the uptakes and the stack, above the main deck was lengthened by the air pressure of the blast. (See photo 2170-12; page 50). The breeching was moderately dished on the starboard side. This is only superficial damage and has no effect on operation.

Boiler #1 was steamed after Test A and performed normally. Hydrostatic tests of boilers 1 and 2 before and after Test A indicate no change in the condition of the boilers. Boiler #3 was completely inspected visually after Test A, and is undamaged.

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## HYDROSTATIC TEST DATA

	Before Test A	After Test A
#1 BOILER		
Initial Pressure	600 lb/sq. in.	600 lb/sq. in.
Time required for pressure to drop		
100 lb/sq. in.	25 minutes	12 minutes
Pressure remaining after		
12 hours	60 lb/sq. in.	25 lb/sq. in.
#3 BOILER		
Initial Pressure	600 lb/sq. in.	600 lb/sq. in.
Time required for pressure to drop		
100 lb/sq. in.	49 lb/sq. in.	46 minutes
Pressure remaining after		
12 hours	294 lb/sq. in.	290 lb/sq. in.

### C. Blowers

Undamaged. All blowers have been operated by steam at normal working pressure since Test A.

### D. Fuel Oil Equipment.

Undamaged. Fireroom #1 - All fuel oil equipment has been operated incident to steaming of #1 boiler since Test A.

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Fireroom #2 - Fuel oil equipment has not been tested but visual examination indicates that it is normal in all respects.

E. Boiler Feedwater Equipment.

Undamaged. All feedwater equipment has been operated incident to operation of the boilers since Test A.

F. Main Propulsion Machinery.

Undamaged. Both units were operated ahead and astern while the ship was underway after Test A. Readings of leads left in the bearings of the after low pressure turbine during Test A are inconclusive, but indicate that no appreciable motion of the rotor took place.

BEARING LEAD DATA

PORT H. P. TURBINE - FORWARD BEARING

No. 1 lead	Before Test A	After Test A	Difference
Port	.010	.008	.002
Top	.013	.012	.001
Stb'd	.012	.008	.004
No. 2 lead			
Port	.009	.008	.001
Top	.012	.012	.000
Stb'd	.011	.008	.003
No. 3 lead			
Port	.007	.010	+ .003
Top	.011	.012	+ .001
Stb'd	.008	.009	+ .001
No. 4 lead			
Port	.008	.010	+ .002
Top	.012	.012	.000
Stb'd	.009	.009	.000

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# PORT H. P. TURBINE - AFTER BEARING

No. 1 lead	Before Test A	After Test A	Difference
Port	.014	.010	.004
Top	.014	.013	.001
Stb'd	.014	.011	.003
No. 2 lead			
Port	.013	.010	.003
Top	.014	.013	.001
Stb'd	.014	.013	.001
No. 3 lead			
Port	.012	.009	.003
Top	.012	.013	+ .001
Stb'd	.012	.012	.000
No. 4 lead			
Port	.012	.009	.003
Top	.012	.013	+ .001
Stb'd	.012	.013	+ .001

## G. Reduction Gears.

Undamaged. Examination through inspection plates while jacking over disclosed no defects. The gears operated normally while the ship was underway after Test A. Lubrication is normal.

## H. Shafting and Bearings.

Undamaged. Shafting and bearings were checked while the shafting was turning over after Test A. No defects were found in the shafting and all bearings operated normally.

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I. Lubrication System.

Undamaged. The lubricating oil system was checked and operated satisfactorily while the ship was underway after Test A.

J. Condensers and Air Ejectors.

Undamaged. Condensers and air ejectors operated satisfactorily incident to the operation of the main engines after Test A.

K. Pumps.

Undamaged. All pumps have been operated at normal speeds and pressures since Test A. Operation is normal.

L. Auxiliary Generators (Turbines and Gears).

Undamaged. Both generators have operated under normal load since Test A.

M. Propellers.

Undamaged. No defects were indicated during operation of the main plant since test A. The propellers are inaccessible for visual inspection.

N. Distilling Plant.

Undamaged. Operation after Test A was satisfactory with the same quality and quantity of water produced as before the test.

O. Refrigeration Plant.

Undamaged. The refrigerating plant has operated normally since Test A.

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P. Winches, Windlasses and Capstans.

Undamaged. The anchor windlass and deck winch operated satisfactorily under load after Test A.

Q. Steering Engine.

Undamaged. The steering engine was operated while the ship was underway after Test A.

R. Elevators, Ammunition Hoists, Etc..

Undamaged. The ammunition hoists were operated at no load after Test A.

S. Ventilation (Machinery).

Undamaged. All ventilation machinery has been operated satisfactorily since Test A.

T. Compressed Air Plant.

Undamaged. The low pressure air compressor has been operated normally since Test A. The high pressure air compressor was inoperable before Test A. Its condition was not changed by the test.

U. Diesels (Generators and Boats).

Undamaged. The emergency diesel generator has been operated at normal load since Test A.

V. Piping Systems.

Undamaged. All systems have been subjected to normal working pressures since Test A.

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W. Miscellaneous.

Laundry, galley, and machine shop equipment was undamaged. The whistle pull was broken. The whistle and siren themselves were not damaged.

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TECHNICAL INSPECTION REPORT

SECTION III - ELECTRICAL

GENERAL SUMMARY OF ELECTRICAL DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

Drafts and list were the same as before Test A.

There was no flooding.

(b) Structural damage.

There was no structural damage in way of electrical equipment.

(c) Other Damage.

No damage occurred to electrical equipment due to Test A.

II. Forces Evidenced and Effects Noted.

(a) Heat.

No evidence of heat in way of electrical equipment.

(b) Fires and explosions.

There were no fires or explosions in way of electrical equipment.

(c) Shock.

There was no evidence of shock in way of electrical equipment.

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(d) Pressure.

There was no evidence of pressure in way of electrical equipment.

(e) Any effects apparently peculiar to the atom bomb.

Radiant heat and radioactivity were evident on exposed surfaces. There was no damage to electrical equipment due to these effects.

III. Effects of Damage.

(a) Effect on propulsion and ship control.

No damage was apparent to electrical machinery or ship control.

(b) Effect on gunnery and fire control.

No damage apparent.

(c) Effect on water-tight integrity and stability.

No electrical damage affected water-tight integrity or stability.

(d) Effect on personnel and habitability.

No electrical damage affected personnel or habitability.

(e) Total effect on fighting efficiency.

No electrical damage affected the fighting efficiency of the vessel.

IV. General Summary of Observers' Impressions and Conclusions.

No damage was evident on any electrical equipment on this vessel. It appears that the effects of the A bomb at the distance

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of this vessel from the center of the blast require no special precautions or designs for electrical equipment.

V. Any Preliminary General or Specific Recommendations of the Inspecting Group.

None.

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## DETAILED DESCRIPTION OF ELECTRICAL DAMAGE

### A. General Description of Electrical Damage.

#### (a) Overall condition.

The overall condition of the electric plant is the same as before the test.

#### (b) Areas of major damage.

None.

#### (c) Primary causes of damage in each area of major damage.

None.

#### (d) Effect of target test on overall operation of electric plant.

1. Ship's service generator - No effect.
2. Engine and boiler auxiliaries - No effect.
3. Electric propulsion - No effect.
4. Communications - No effect.
5. Fire control circuits - No effect.
6. Ventilation - No effect.
7. Lighting - No effect.

#### (e) Types of equipment most affected.

None.

### B. Electric Propulsion Rotating Equipment.

Not Applicable.

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C. Electric Propulsion Control Equipment.

Not Applicable.

D. Generators - Ships Service.

No damage.

E. Generators - Emergency.

No damage.

F. Switchboards, Distribution and Transfer Panels.

No damage.

G. Wiring, Wiring Equipment and Wireways.

No damage.

H. Transformers.

No damage.

I. Submarine Propelling Batteries.

Not applicable.

J. Portable Batteries.

No damage.

K. Motors, Motor Generator Sets and Motor Controllers.

No damage.

L. Lighting Equipment.

No damage.

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M. Searchlights.

No damage.

N. Degaussing Equipment.

No damage.

O. Gyro Compass Equipment.

No damage.

P. Sound Powered Telephones.

No damage.

Q. Ship's Service Telephones.

Not applicable.

R. Announcing Systems.

No damage.

S. Telegraphs.

No damage.

T. Indicating Systems.

No damage.

U. I.C. and A.C.O. Switchboards.

No damage.

V. F.C. Switchboard.

No damage.

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W. 660 SPECIAL MATERIAL

No damage.

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SECTION IV

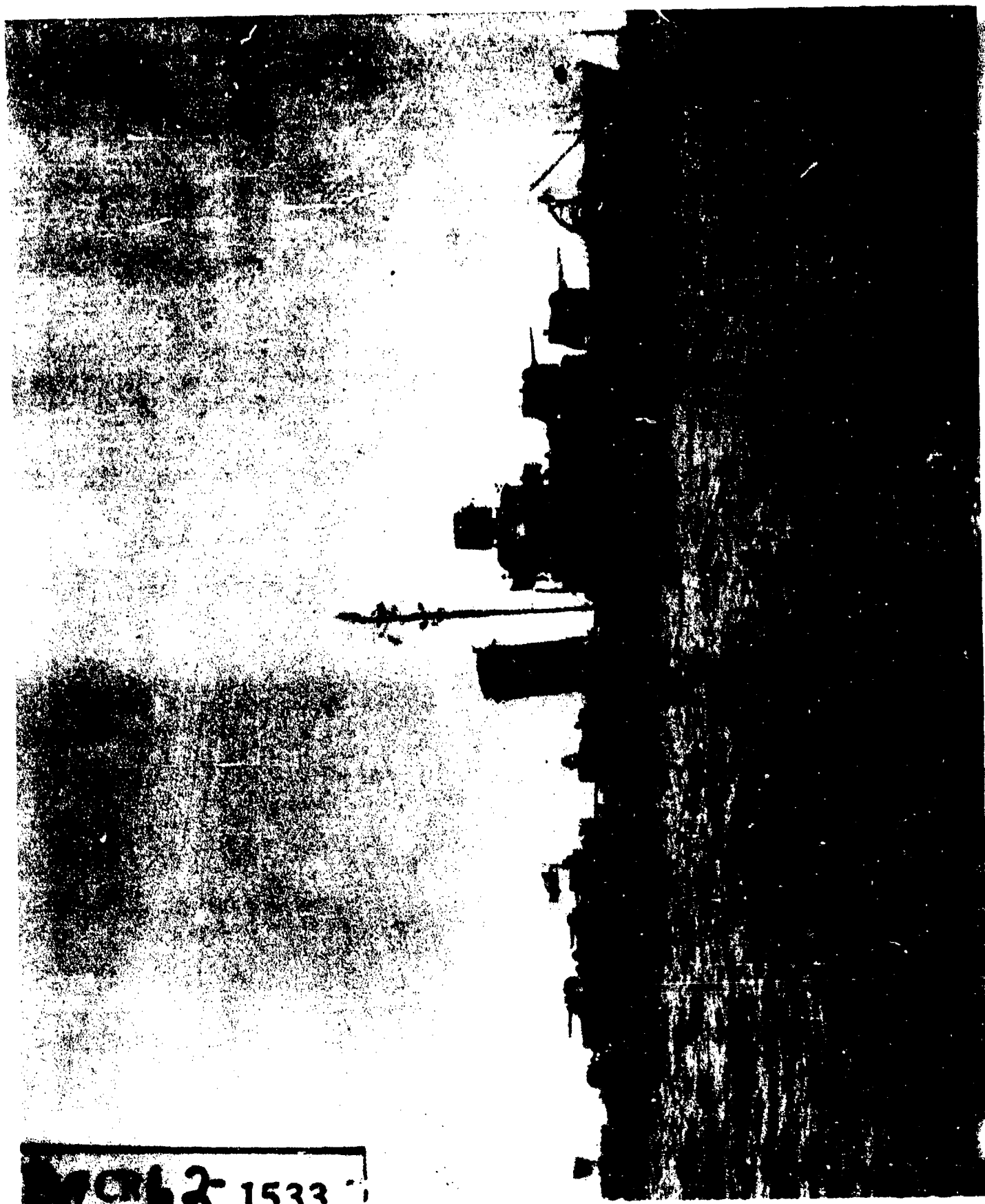
PHOTOGRAPHS

TEST ABLE

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BA-CR-62-1533-7. View from off starboard beam.

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AA-CR-82-1826-7. View from off port bow.

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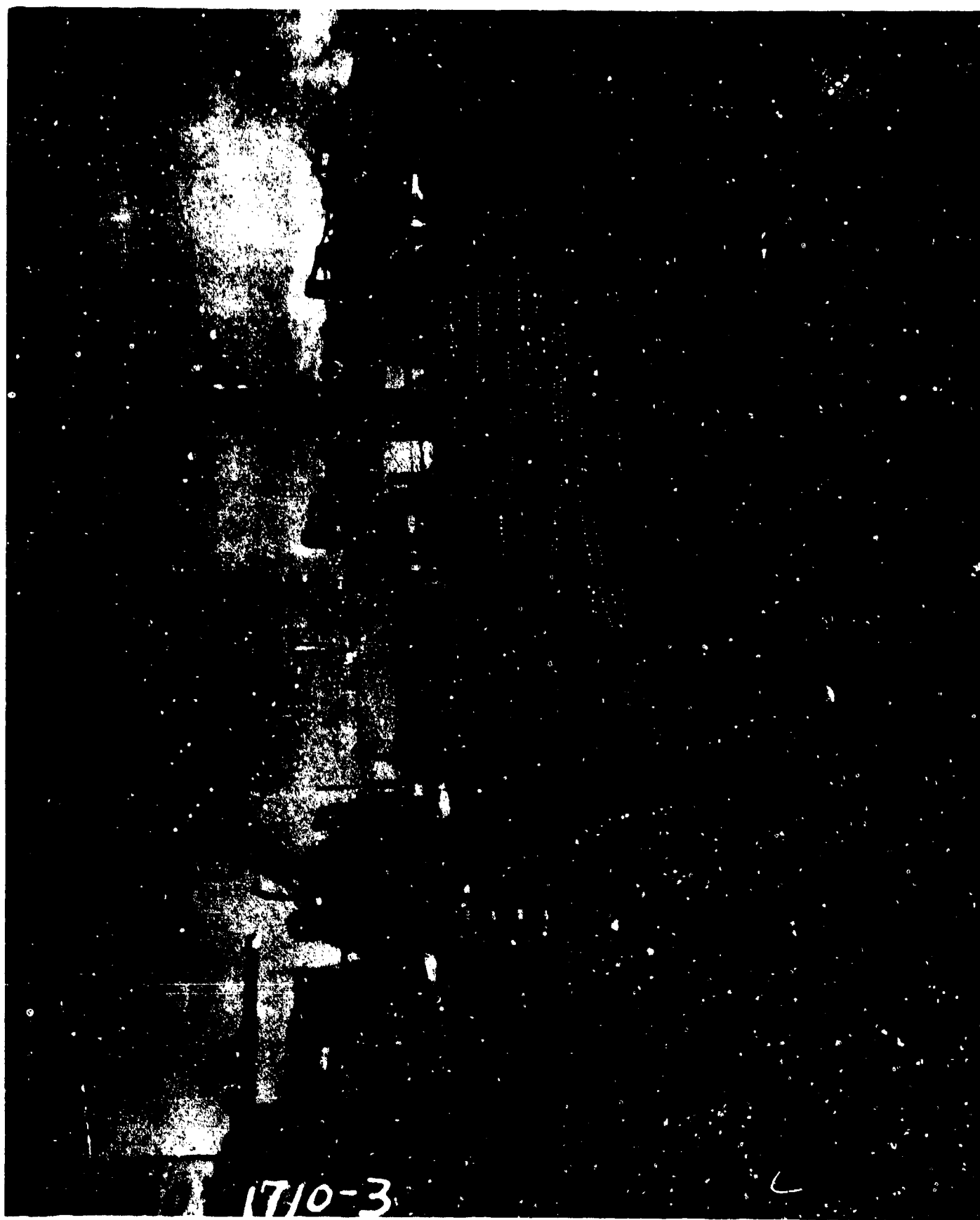
AA-CR-60-1710-4. View from off port bow (bridge to stern).

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AA-CR-60-1710-3. Close-up from off port quarter, frames 168 to stern.

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AA-CR-58-2006-2. 'Looking forward and inboard on forecastle deck showing damage to radio room door and door frame (at frame 70 1/2).

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AA-CR-58-2005-12. Looking aft and inboard on starboard side of forecastle deck showing dishing of door to radio room, and starboard flag bag fallen from signal bridge.

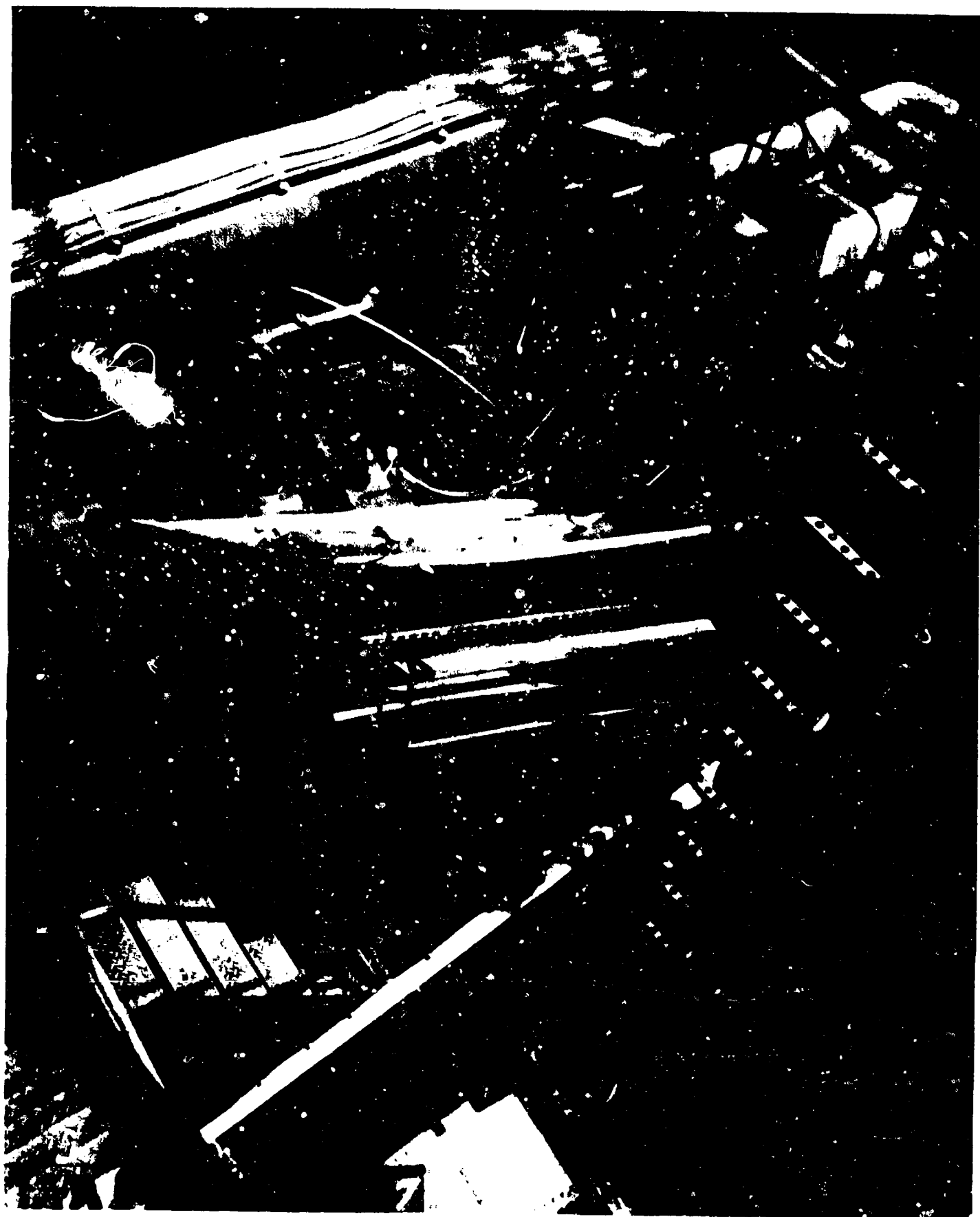
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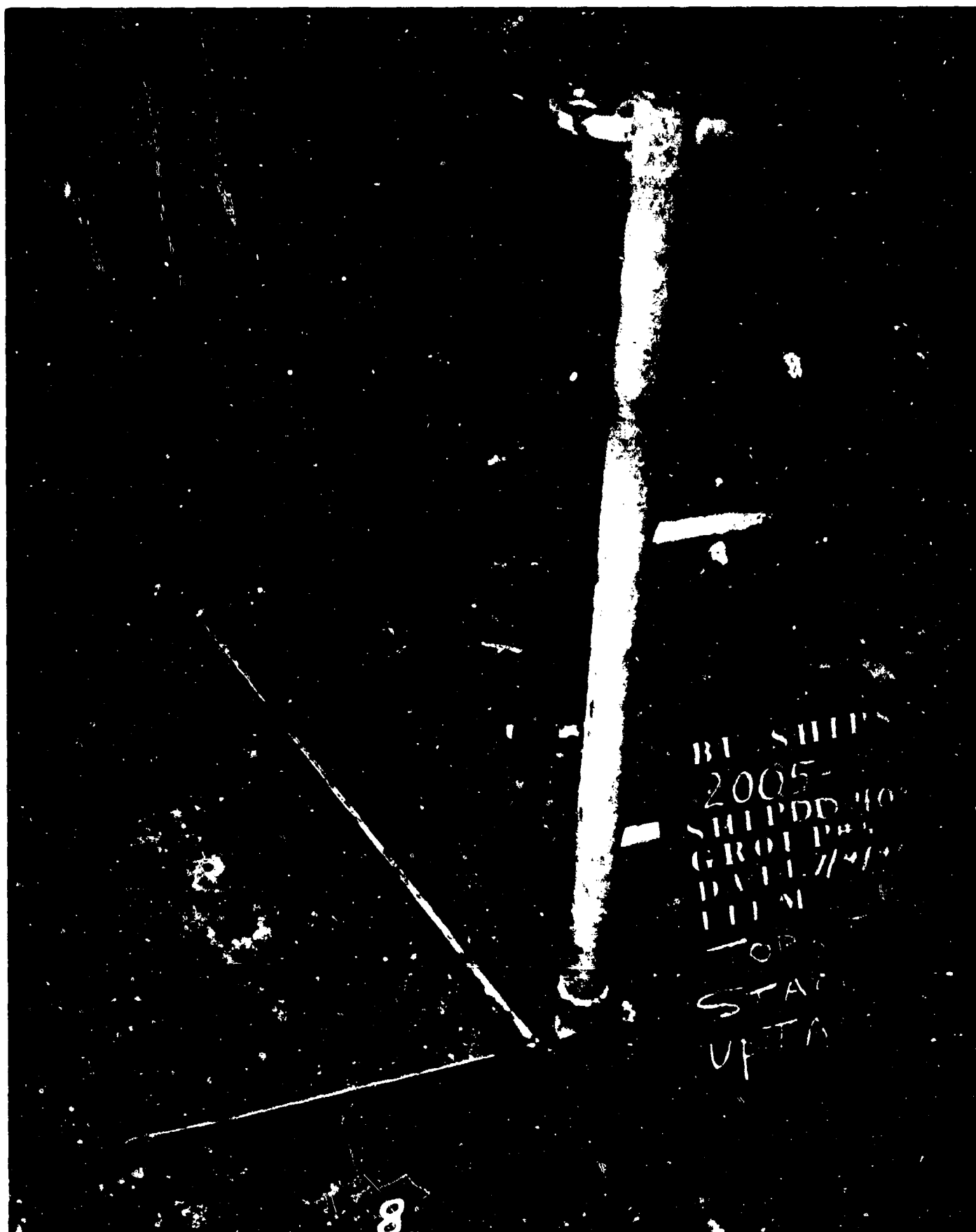
AA-CR-58-2005-7. Looking down, aft, and to starboard, showing starboard flag bag, fallen from after edge of signal bridge.

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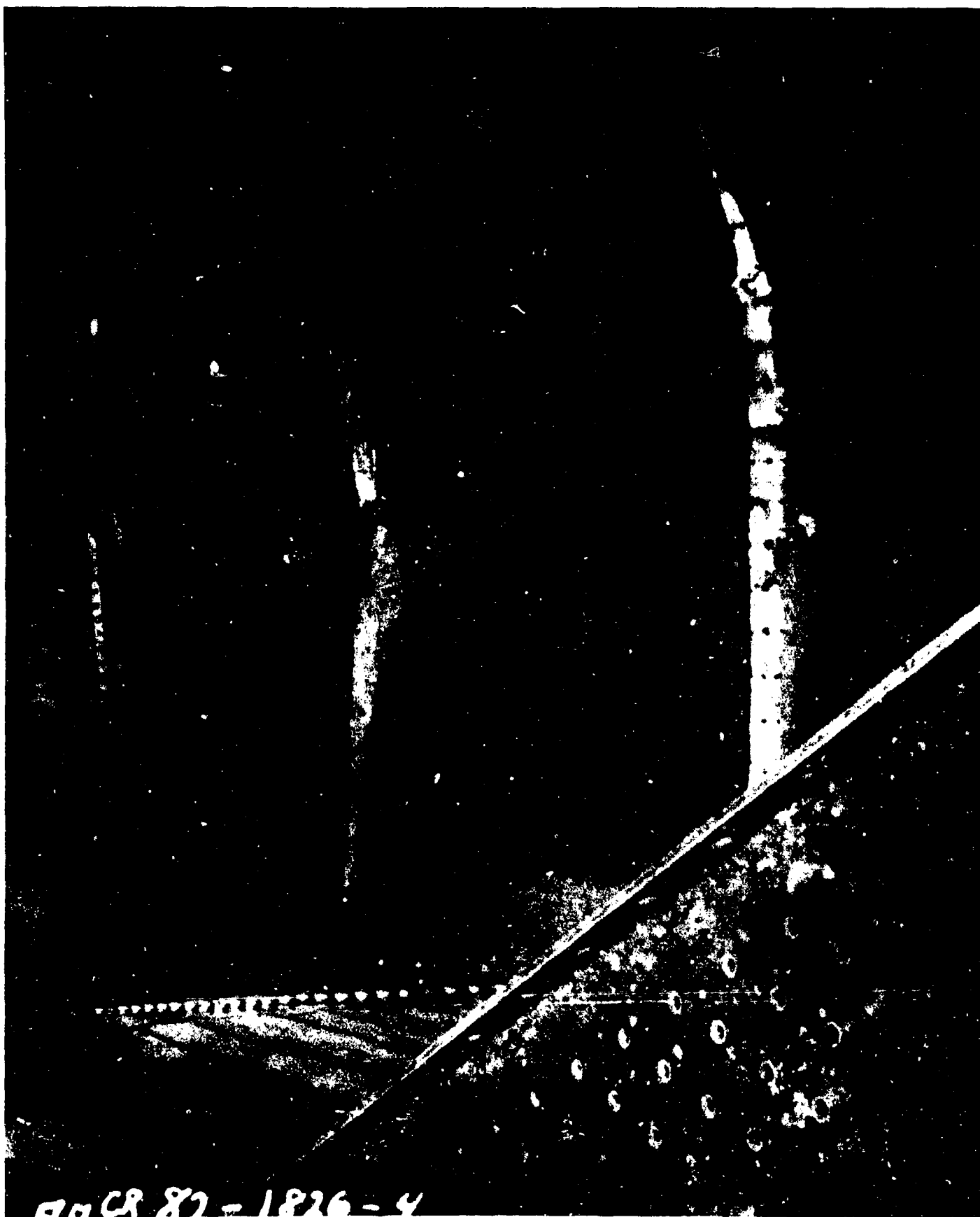
AA-CR-58-2005-8. Damage to top of stack breeching looking aft.

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AA-CR-82-1826-4. Close-up of damage to stack forward breeching looking aft.

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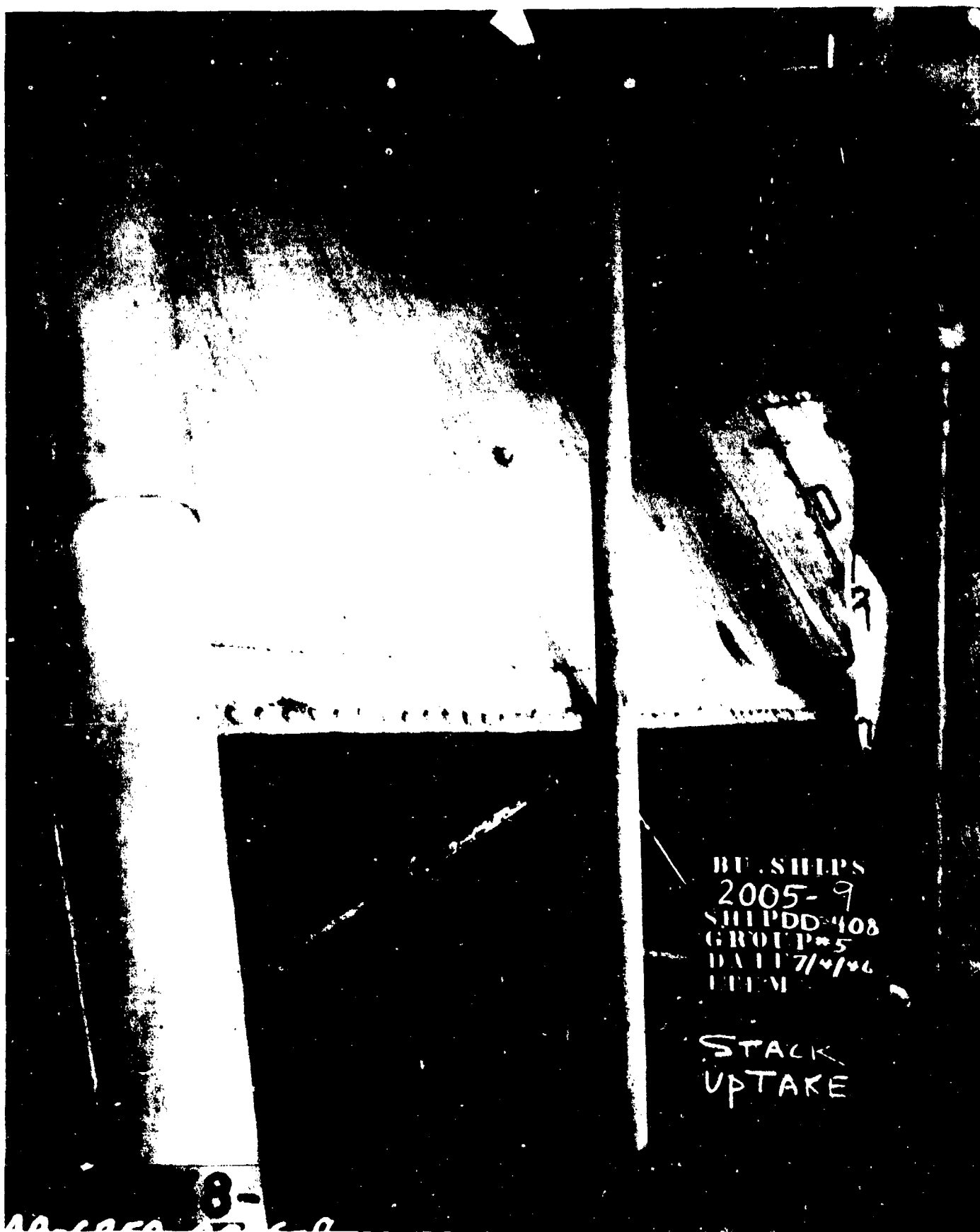
AA-CR-62-2170-12. Looking down and forward showing damage to starboard side of stack forward breeching.

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AA-CR-58-2005-9. Damage to starboard side of stack breeching, looking forward.

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AA-CR-82-1826-5

AA-CR-82-1826-5. Close-up of damage to starboard side of stack breeching.

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AA-CR-65-1850-4. Looking aft and to port showing burned paint on forward side of 40 MM gun tub, frame 126, caused by burning of kapok life jackets in life net stowage rack.

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AA-CR-58-2006-3. Close-up of dishing of starboard shell between forecastle deck and main deck, frames 40 to 69. Note buckle in way of frame 52.

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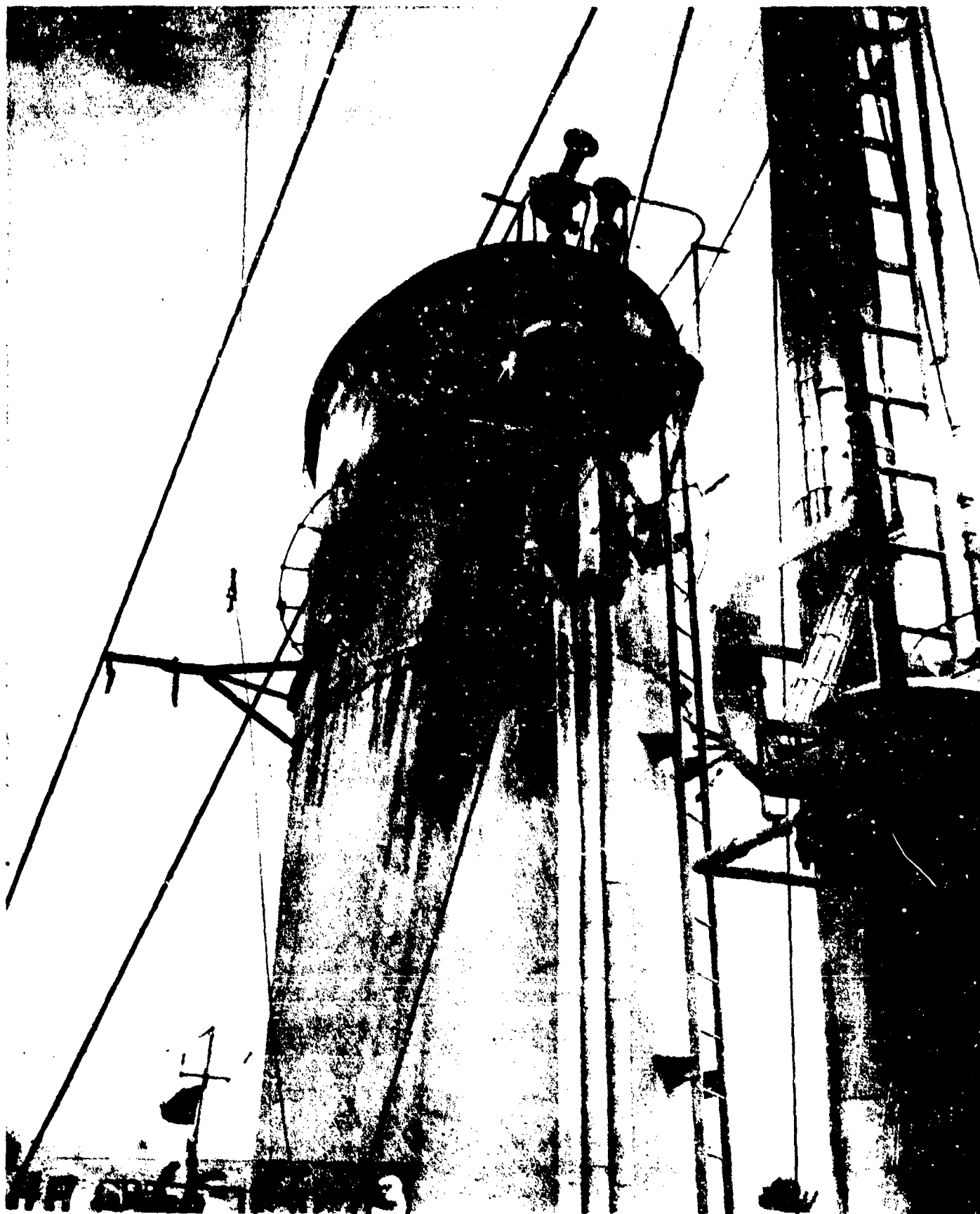
AA-CR-58-2006-4. Close-up of dishing of starboard shell between  
forecastle deck and main deck, frames 40 to 69, looking up and aft.  
(Note rope shadow.)

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AA-CR-65-1850-3. Looking aft and to port, showing paint damage on stack.

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APPENDIX

SHIPS MEASUREMENT DIAGRAM

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## DECK DEFLECTION GAGES

SHIP U.S.S. WILSON (DD-408) TEST A

FR. NO.	LOCATION		MAXIMUM COMP.	MAXIMUM EXP.	PERMANENT		SET EXP./COMP.	REMARKS
	DECK	DIST. OFF &			DISTANCE	EXP.		
17	MAIN	CENTER L.	NONE	NONE	NONE	NONE	NONE	NONE
38	"	"	"	"	"	"	"	"
38	"	PORT	"	"	"	"	"	"
151	2ND	CENTER L.	"	"	"	"	"	"
172 1/2	"	STBD.	0-0-9/16	"	"	"	"	"
172 1/2	"	PORT	0-0-7/8	"	"	"	"	"

APPENDIX

COMMANDING OFFICERS REPORT

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REPORT #11

COMMANDING OFFICER'S REPORT

PART A - GENERAL SUMMARY

I. Target Condition After Test.

(a) The draft of the ship was 12'6" forward and 11'1" aft, the same as before the test. There was no list either before the test or after the test. There was no flooding.

(b) Structural Damage.

1. The only structural damage may be listed as below:

a. At about frame 59, superstructure deck, the starboard bulkhead of CIC was pushed in about 1/4".

b. About frame 69, foc'sle deck, the water-tight door of the Radio Shack was dished in about 1/2".

c. About frame 70, the starboard flag bag was blown down.

d. The forward part of the uptakes on the starboard side were dished in about 1". The top part of the forward uptakes were ruffled slightly.

e. On both sides of the forward starboard corner of the Mk 33 director, the plating was pushed in about 1" at the bottom. The top was undamaged.

f. The hull had several places that were dished in between frames 60 and 80, the maximum displacement being about 1".

g. There were about five other water-tight doors dished in varying degrees from amidships to the bridge.

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h. The chart house bulkhead was slightly dished.

i. One main stay was broken at the turnbuckle. This had been broken previously and was given a spot weld when repaired.

(c) Operability.

The operability of the ship was not affected by the blast. The ship would have been embarrassed in communications as all the vertical antenna were blown down, but otherwise the ship would have been able to continue operations.

(d) Heat and Fires.

The heat of the blast was enough to start one small fire in the floater net stowage where life jackets were stowed for the test. These life jackets were covered with a white cloth which evidently was the piece which caught fire. The paintwork was scorched where the blast hit the ship.

The personnel who would have been on the starboard side and not covered would have had dangerous flash burns. The flash was so temporary, however, that if a man were concealed from the effects of the blast at the second it hit the ship, either by protective clothing or a shield, he probably would have survived. The flash hazard however even at 1500 yards cannot be over emphasized.

II. Forces Evidenced and Effects Noted.

(a) Heat.

The heat hit the ship from approximately 15 degrees off the starboard bow. The heat rays traveled in a straight line much as light rays. This was evidenced by the effects of shadows of unscorched paint left on the bulkheads where they were protected by some object at least 6 inches away from the bulkhead.

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The effect of the heat upon the objects it hit was not much. Besides scorching the paint of the bulkheads and hull, it singed the manila lines and burned slightly the rubber hoses. There seemed to be no weakening of structural members due to the heat.

(b) Fires.

The only fire occurred in the starboard floater net at about frame 120. This floater net had kapok life jackets stored in it and covered by a piece of white cloth. The fire spread to a box below and then died out. The damage done by the fire was not important. The fire was caused by the blast hitting this white cloth which later spread to the life jackets. This floater net is curved and was on a part of the ship that was not shielded from the blast, so that at one point of the net the blast hit at right angles to the net.

(c) Shock Damage.

There appeared to be no damage from shock.

(d) Pressure.

The pressure came from about 15 to 30 degrees off the starboard bow. The damage done is listed in paragraph B, page 1. The force of the pressure was enough to tear the Yoke flag into shreds, depositing one shred on the fantail, all that was found of the flag. The apparent direction of the pressure was from about 25 degrees off the starboard bow. The extreme pressure upon the ship seemed to be between frames 60 and 80 where most of the damage was done.

(e) Effects Peculiar to the Atomic Bomb.

A sheet of ordinary white paper with sunset and sunrise times written in ordinary ink was placed in a holder on the port side of the bridge. All of the ports were closed. After the test, the writing on the paper appeared burned whereas the paper was relatively untouched. It is doubtful that the heat blast could get through the water-tight ports due to its instantaneous properties.

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The paper had the appearance that it might have been burned by the light rays that came through the port. The Bureau of Ordnance has taken pictures of this peculiarity.

### III. Results of Test on Target.

- (a) The ship propulsion and ship control was not affected.
- (b) No guns, drive systems, nor the director were injured by the bomb.
- (c) There was no effect on the water-tight integrity and stability of the ship by the blast. The only water-tight doors dished in were on or above the main deck and would not affect flotation of the ship.
- (d) The personnel would be affected by the heat, light, and pressure blasts, and the radioactivity of the bomb. The radioactivity was measured by pills, but the results were not disclosed, so the affect of radioactivity is not known.

Of the other three effects, it is believed that the heat damage would be the greatest. In order to survive the heat blast, the men would have to be behind some bulwark or be completely covered by protective clothing. The very bright light would have undoubtedly temporarily if not permanently blinded all personnel looking in the direction of the bomb. If the light was strong enough to burn writing on a piece of paper, it would surely be strong enough to injure a man's eyes. The blast effect would tend to push the personnel from their stations and in some cases might have blown some personnel overboard, but this affect would have been only temporary at the most.

(e) The fighting efficiency would have been reduced first by the casualties to the personnel and second by the damage to the material. Of the two, the first would have been by far the most serious for the ship. With no personnel casualties, the ship probably would have been able to keep up with fighting operations, hampered only by poor communications. However, under present conditions, it is doubtful that enough personnel would have been left to fight the ship efficiently.

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#### IV. General Summary.

The potential damage of the bomb against personnel seems to be its greatest asset. The ship's operability was not affected, but it is believed that due to personnel reasons, the ship would have continued to operate at a much reduced efficiency if at all. Even the threat of the bomb would require the topside personnel to wear a full suit of protective clothing and dark glasses which would reduce the efficiency prior to the dropping of the bomb.

#### V. Preliminary Recommendation.

There were no recommendations of the inspecting group for this ship.

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## PART C - INSPECTION REPORT

### SECTION A - HULL

#### A. General Description of Hull Damage.

(a) The overall condition of the ship after the test was excellent and as far as the hull, flooding, stability were concerned, the fighting efficiency of the ship was not affected.

(b) The major blast seemed to hit at about frame 60. The hull was dished in several places between frames 60 and 80, the maximum displacement being about 1".

(c) The only hull damage was mentioned in paragraph 2 above. The cause of this was the pressure of the blast upon the hull.

(d) There was no flooding.

(e) The residual strength, buoyancy, and effect of the general condition of the hull was such that the operability was not affected.

#### B. Superstructure.

##### (a) Description of Damage.

1. The door to the chart house was dished about 1/4". This was an aluminum door about 1/8" thickness.

2. The bulkhead of CIC was dished about 1/2" in the center.

3. The door to the Radio Shack was blown in about 1 and 1/4". This was the same construction and thickness as the door to the chart house.

4. The forward uptakes were ruffled about 2" in some places along the top and starboard side.

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5. The flag bag was thrown from its supports on to the cat walk.

(b) The blast effect caused the above damage.

(c) There was no fire in the superstructure.

(d) The galvanized steel used for the shields of the 20MM and 40MM guns and directors fared the best. The only shield noticeably bent was the straight part of the shield protecting the Mk 51 director, just forward of the bridge. In all other cases the shield was curved so that the convex part faced the blast. In the cases of the starboard shields, all the shields were subject to the fullest extent of the blast.

The aluminum structures appeared to be the weakest, as all of the water-tight doors topside were aluminum and four of them were damaged.

(e) The flag bags were fitted with four weak supports to the bridge and are not well protected from the blast. Smaller flag bags with less sail area and stronger fittings would prevent them from being blown down.

C and D.

There was no damage to ordnance gear.

E. Weather Deck.

(a) The deck did not show any effects from the blast except that the paint was scorched in several places on the foc'sle.

(b) The whaleboat was damaged by the flag bag falling on the canopy. Otherwise there was no other cause of damage to the whaleboat.

F. Exterior Hull.

The exterior hull was not damaged except for several parts between frames 60 and 80 being dished in, some parts as much as 1",

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others were less. The damage was caused by the pressure of the blast.

G - S.

No damage done.

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**PART C - INSPECTION REPORT**

**SECTION B - MACHINERY**

**A. General Description of Machinery damage.**

There was no machinery damage caused by the test.

**B - W.**

No comments.

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**USS WILSON (DD408)**

PART C - INSPECTION REPORT

SECTION C - ELECTRICAL

A. General Description of Electrical Damage.

There was no electrical damage caused by the test.

B - V.

No comment.

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PART C - INSPECTION REPORT

SECTION D - ELECTRONICS

A. General Description of Electronic Damage.

- (a) The overall condition of the electronic gear was excellent.
- (b) There were no areas of major damage.
- (c) The primary cause of damage was due to falling objects, blast, and possibly radio active waves.
- (d) Operability of electronics equipment.

1. All radars operated satisfactorily.

2. The radios with the exception of the RBC operated satisfactorily. The RBC had six faulty tubes throughout the set. It is possible that radio waves entered the antenna before it was blown down and was too strong for the tubes. However, the cause for the failures is not yet determined.

3. The Sonar and Loran gear operate satisfactorily.

B. The TBS failed due to the breaking of the fan blades of the cooling fan inside of the motor generator.

C. Two transmitting antennae and three receiving antennae are down, partly due to the flag bag hitting them and partly due to the blast knocking them down.

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Classification (Cancelled) (Changed to **CONFIDENTIAL**)  
By Authority of Joint Chiefs of Staff (Action 15 Apr 49)  
By *[Signature]* Date *24 April 51*

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**Defense Special Weapons Agency**  
6801 Telegraph Road  
Alexandria, Virginia 22310-3398

TRC

4 April 1997

MEMORANDUM TO DEFENSE TECHNICAL INFORMATION CENTER  
ATTN: OMI/Mr Bill Bush

SUBJECT: Declassification of Documents

The following is a list of documents that have been declassified and the distribution statement changed to Statement A, Approved for Public Release.

XRD-41, AD-366731-  
XRD-42, AD-366732-  
XRD-40, AD-366730-  
XRD-39, AD-366729-  
XRD-38, AD-366728-  
XRD-34, AD-366720-  
XRD-13, AD-366725-  
XRD-8, AD-366699-  
XRD-5, AD-366697-  
XRD-6, AD-366698-  
XRD-21, AD-366708-  
XRD-27, AD-366714-  
XRD-22, AD-366709-  
XRD-26, AD-366713-  
XRD-28, AD-366715-  
XRD-29, AD-366727-  
XRD-36, AD-366722-

If you have any questions, please call me at 703-325-1034.

*Arndith Jarrett*

ARDITH JARRETT  
Chief, Technical Resource Center